

$\omega(782)$ $I^G(J^{PC}) = 0^-(1^- -)$

NODE=M001

 $\omega(782)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
782.65±0.12 OUR AVERAGE		Error includes scale factor of 1.9.		See the ideogram below.
783.20±0.13±0.16	18680	AKHMETSHIN 05	CMD2	$0.60\text{--}1.38 e^+ e^- \rightarrow \pi^0 \gamma$
782.68±0.09±0.04	11200	¹ AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
782.79±0.08±0.09	1.2M	² ACHASOV 03D	RVUE	$0.44\text{--}2.00 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
782.7 ± 0.1 ± 1.5	19500	WURZINGER 95	SPEC	$1.33 pd \rightarrow {}^3\text{He}\omega$
781.96±0.17±0.80	11k	³ AMSLER 94C	CBAR	$0.0 \bar{p}p \rightarrow \omega \eta \pi^0$
782.08±0.36±0.82	3463	⁴ AMSLER 94C	CBAR	$0.0 \bar{p}p \rightarrow \omega \eta \pi^0$
781.96±0.13±0.17	15k	AMSLER 93B	CBAR	$0.0 \bar{p}p \rightarrow \omega \pi^0 \pi^0$
782.4 ± 0.2	270k	WEIDENAUER 93	ASTE	$\bar{p}p \rightarrow 2\pi^+ 2\pi^- \pi^0$
782.2 ± 0.4	1488	KURDADZE 83B	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
782.4 ± 0.5	7000	⁵ KEYNE 76	CNTR	$\pi^- p \rightarrow \omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
781.91±0.24		⁶ LEES 12G	BABR	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
781.78±0.10		⁷ BARKOV 87	CMD	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
783.3 ± 0.4	433	CORDIER 80	DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
782.5 ± 0.8	33260	ROOS 80	RVUE	$0.0\text{--}3.6 \bar{p}p$
782.6 ± 0.8	3000	BENKHEIRI 79	OMEG	$9\text{--}12 \pi^\pm p$
781.8 ± 0.6	1430	COOPER 78B	HBC	$0.7\text{--}0.8 \bar{p}p \rightarrow 5\pi$
782.7 ± 0.9	535	VANAPEL...	HBC	$7.2 \bar{p}p \rightarrow \bar{p}p\omega$
783.5 ± 0.8	2100	GESSAROLI 77	HBC	$11 \pi^- p \rightarrow \omega n$
782.5 ± 0.8	418	AGUILAR-...	HBC	$3.9, 4.6 K^- p$
783.4 ± 1.0	248	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K^+ K^- \omega$
781.0 ± 0.6	510	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K_1 K_1 \omega$
783.7 ± 1.0	3583	⁸ COYNE 71	HBC	$3.7 \pi^+ p \rightarrow p\pi^+ \pi^+ \pi^- \pi^0$
784.1 ± 1.2	750	ABRAMOVI... 70	HBC	$3.9 \pi^- p$
783.2 ± 1.6		⁹ BIGGS 70B	CNTR	$<4.1 \gamma C \rightarrow \pi^+ \pi^- C$
782.4 ± 0.5	2400	BIZZARRI 69	HBC	$0.0 \bar{p}p$

1 Update of AKHMETSHIN 00C.

2 From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+ \pi^- \pi^0$ and ANTONELLI 92 on the $\omega \pi^+ \pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.3 From the $\eta \rightarrow \gamma\gamma$ decay.4 From the $\eta \rightarrow 3\pi^0$ decay.

5 Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.

6 From the $\rho - \omega$ interference in the $\pi^+ \pi^-$ mass spectrum using the Breit-Wigner for the ω and leaving its mass and width as free parameters of the fit.

7 Systematic uncertainties underestimated.

8 From best-resolution sample of COYNE 71.

9 From ω - ρ interference in the $\pi^+ \pi^-$ mass spectrum assuming ω width 12.6 MeV.

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OCCUR=2

OCCUR=2

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NODE=M001M;LINKAGE=S1

NODE=M001M;LINKAGE=S2

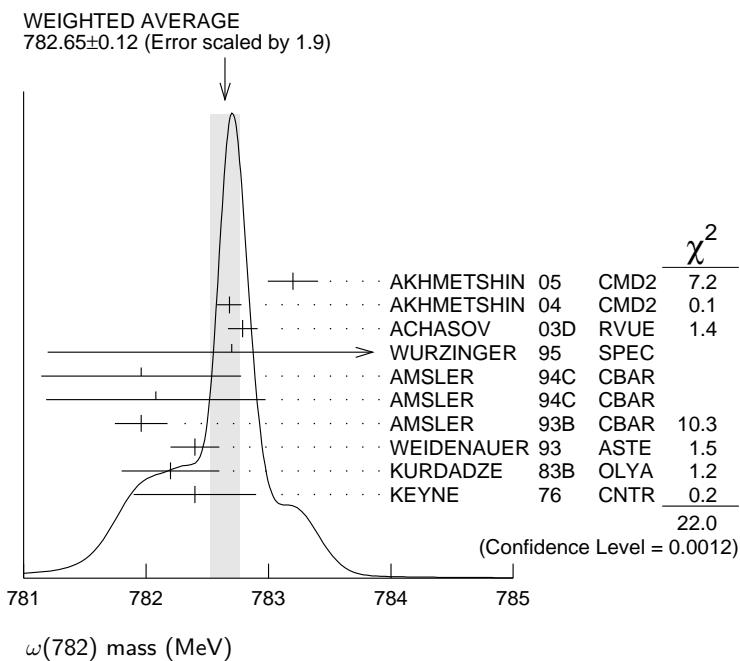
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NODE=M001M;LINKAGE=LE

NODE=M001M;LINKAGE=KB

NODE=M001M;LINKAGE=D

NODE=M001M;LINKAGE=F



$\omega(782)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
8.49 ± 0.08 OUR AVERAGE				
$8.68 \pm 0.23 \pm 0.10$	11200	¹ AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
$8.68 \pm 0.04 \pm 0.15$	1.2M	² ACHASOV 03D	RVUE	$0.44-2.00 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
8.2 ± 0.3	19500	WURZINGER 95	SPEC	$1.33 pd \rightarrow {}^3He\omega$
8.4 ± 0.1		³ AULCHENKO 87	ND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
8.30 ± 0.40		BARKOV 87	CMD	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
9.8 ± 0.9	1488	KURDADZE 83B	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
9.0 ± 0.8	433	CORDIER 80	DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
9.1 ± 0.8	451	BENAKSAS 72B	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8.13 ± 0.45		⁴ LEES 12G	BABR	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
12 ± 2	1430	COOPER 78B	HBC	$0.7-0.8 \bar{p}p \rightarrow 5\pi$
9.4 ± 2.5	2100	GESSAROLI 77	HBC	$11 \pi^- p \rightarrow \omega n$
10.22 ± 0.43	20000	⁵ KEYNE 76	CNTR	$\pi^- p \rightarrow \omega n$
13.3 ± 2	418	AGUILAR-...	HBC	$3.9, 4.6 K^- p$
10.5 ± 1.5		BORENSTEIN 72	HBC	$2.18 K^- p$
$7.70 \pm 0.9 \pm 1.15$	940	BROWN 72	MMS	$2.5 \pi^- p \rightarrow n MM$
10.3 ± 1.4	510	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K_1 K_1 \omega$
12.8 ± 3.0	248	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K^+ K^- \omega$
9.5 ± 1.0	3583	COYNE 71	HBC	$3.7 \pi^+ p \rightarrow p\pi^+ \pi^+ \pi^- \pi^0$

¹ Update of AKHMETSHIN 00C.

² From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+ \pi^- \pi^0$ and ANTONELLI 92 on the $\omega \pi^+ \pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.

³ Relativistic Breit-Wigner includes radiative corrections.

⁴ From the $\rho - \omega$ interference in the $\pi^+ \pi^-$ mass spectrum using the Breit-Wigner for the ω and leaving its mass and width as free parameters of the fit.

⁵ Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.

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NODE=M001W;LINKAGE=PT

NODE=M001W;LINKAGE=VH

NODE=M001W;LINKAGE=D

NODE=M001W;LINKAGE=LE

NODE=M001W;LINKAGE=B

NODE=M001215;NODE=M001

DESIG=1

DESIG=3

DESIG=2

DESIG=13

$\omega(782)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
$\Gamma_1 \pi^+ \pi^- \pi^0$	$(89.2 \pm 0.7) \%$	
$\Gamma_2 \pi^0 \gamma$	$(8.28 \pm 0.28) \%$	S=2.1
$\Gamma_3 \pi^+ \pi^-$	$(1.53^{+0.11}_{-0.13}) \%$	S=1.2
Γ_4 neutrals (excluding $\pi^0 \gamma$)	$(8^{+8}_{-5}) \times 10^{-3}$	S=1.1

Γ_5	$\eta\gamma$	$(4.6 \pm 0.4) \times 10^{-4}$	S=1.1	DESIG=6
Γ_6	$\pi^0 e^+ e^-$	$(7.7 \pm 0.6) \times 10^{-4}$		DESIG=14
Γ_7	$\pi^0 \mu^+ \mu^-$	$(1.3 \pm 0.4) \times 10^{-4}$	S=2.1	DESIG=11
Γ_8	$\eta e^+ e^-$			DESIG=18
Γ_9	$e^+ e^-$	$(7.28 \pm 0.14) \times 10^{-5}$	S=1.3	DESIG=7
Γ_{10}	$\pi^+ \pi^- \pi^0 \pi^0$	$< 2 \times 10^{-4}$	CL=90%	DESIG=12
Γ_{11}	$\pi^+ \pi^- \gamma$	$< 3.6 \times 10^{-3}$	CL=95%	DESIG=4
Γ_{12}	$\pi^+ \pi^- \pi^+ \pi^-$	$< 1 \times 10^{-3}$	CL=90%	DESIG=15
Γ_{13}	$\pi^0 \pi^0 \gamma$	$(6.6 \pm 1.1) \times 10^{-5}$		DESIG=5
Γ_{14}	$\eta \pi^0 \gamma$	$< 3.3 \times 10^{-5}$	CL=90%	DESIG=17
Γ_{15}	$\mu^+ \mu^-$	$(9.0 \pm 3.1) \times 10^{-5}$		DESIG=8
Γ_{16}	3γ	$< 1.9 \times 10^{-4}$	CL=95%	DESIG=10

Charge conjugation (C) violating modes

Γ_{17}	$\eta\pi^0$	$C < 2.1 \times 10^{-4}$	CL=90%	NODE=M001;CLUMP=A
Γ_{18}	$2\pi^0$	$C < 2.1 \times 10^{-4}$	CL=90%	DESIG=9
Γ_{19}	$3\pi^0$	$C < 2.3 \times 10^{-4}$	CL=90%	DESIG=193

Γ_{19}	$C < 2.3 \times 10^{-4}$	CL=90%	DESIG=16
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CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 51 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 51.8$ for 42 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	22								
x_3	-18	-4							
x_4	-92	-56	1						
x_5	7	7	-1	-9					
x_6	-1	0	0	0	0				
x_7	-1	0	0	0	0	0			
x_9	-38	-33	7	44	-21	0	0		
x_{13}	1	4	0	-2	0	0	0	-1	
x_{15}	0	0	0	0	0	0	0	0	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_9	x_{13}

$\omega(782)$ PARTIAL WIDTHS

$\Gamma(\pi^0\gamma)$				Γ_2
VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •

$788 \pm 12 \pm 27$	36500	¹ ACHASOV	03	SND	$0.60 - 0.97 e^+ e^- \rightarrow \pi^0 \gamma$
764 ± 51	10625	DOLINSKY	89	ND	$e^+ e^- \rightarrow \pi^0 \gamma$

¹ Using $\Gamma_\omega = 8.44 \pm 0.09$ MeV and $B(\omega \rightarrow \pi^0 \gamma)$ from ACHASOV 03.

$\Gamma(\eta\gamma)$				Γ_5
VALUE (keV)	DOCUMENT ID	TECN	COMMENT	

• • • We do not use the following data for averages, fits, limits, etc. • • •

6.1 ± 2.5	¹ DOLINSKY	89	ND	$e^+ e^- \rightarrow \eta\gamma$
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¹ Using $\Gamma_\omega = 8.4 \pm 0.1$ MeV and $B(\omega \rightarrow \eta\gamma)$ from DOLINSKY 89.

NODE=M001218

NODE=M001W1
NODE=M001W1

NODE=M001W1;LINKAGE=AD

NODE=M001W2
NODE=M001W2

NODE=M001W2;LINKAGE=DA

$\Gamma(e^+e^-)$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_9
0.60 ±0.02 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.591±0.015	11200	1,2 AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
0.653±0.003±0.021	1.2M	3 ACHASOV 03D	RVUE	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
0.600±0.031	10625	DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$	
1 Using $B(\omega \rightarrow \pi^+\pi^-\pi^0) = 0.891 \pm 0.007$ and $\Gamma_{\text{total}} = 8.44 \pm 0.09$ MeV.					
2 Update of AKHMETSHIN 00C.					
3 Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.					

NODE=M001W7

NODE=M001W7

→ UNCHECKED ←

NODE=M001W7;LINKAGE=3P

NODE=M001W7;LINKAGE=PT

NODE=M001W;LINKAGE=VF

NODE=M001225

NODE=M001G2

NODE=M001G2

 $\omega(782) \Gamma(e^+e^-)\Gamma(i)/\Gamma^2(\text{total})$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_9/\Gamma \times \Gamma_1/\Gamma$
6.49±0.11 OUR FIT Error includes scale factor of 1.3.					
6.38±0.10 OUR AVERAGE				• • • We do not use the following data for averages, fits, limits, etc. • • •	
6.24±0.11±0.08	11.2k	1 AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
6.70±0.06±0.27		AUBERT,B 04N	BABR	$10.6 e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$	
6.74±0.04±0.24	1.2M	2,3 ACHASOV 03D	RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
6.37±0.35		2 DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
6.45±0.24		2 BARKOV 87	CMD	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
5.79±0.42	1488	2 KURDADZE 83B	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
5.89±0.54	433	2 CORDIER 80	DM1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
7.54±0.84	451	2 BENAKSAS 72B	OSPK	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
6.20±0.13		4 BENAYOUN 10	RVUE	$0.4-1.05 e^+e^-$	

1 Update of AKHMETSHIN 00C.

2 Recalculated by us from the cross section in the peak.

3 From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.4 A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-, \pi^+\pi^-\pi^0, \pi^0\gamma, \eta\gamma$ data.

NODE=M001G;LINKAGE=PT

NODE=M001G;LINKAGE=LP

NODE=M001G;LINKAGE=VH

NODE=M001G2;LINKAGE=BE

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_9/\Gamma \times \Gamma_2/\Gamma$
6.02±0.20 OUR FIT Error includes scale factor of 1.9.					
6.45±0.17 OUR AVERAGE				• • • We do not use the following data for averages, fits, limits, etc. • • •	
6.47±0.14±0.39	18680	AKHMETSHIN 05	CMD2	$0.60-1.38 e^+e^- \rightarrow \pi^0\gamma$	
6.50±0.11±0.20	36500	1 ACHASOV 03	SND	$0.60-0.97 e^+e^- \rightarrow \pi^0\gamma$	
6.34±0.21±0.21	10625	2 DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$	

1 Using $\sigma_{\phi \rightarrow \pi^0\gamma}$ from ACHASOV 00 and $m_\omega = 782.57$ MeV in the model with the energy-independent phase of $\rho\omega$ interference equal to $(-10.2 \pm 7.0)^\circ$.

2 Recalculated by us from the cross section in the peak.

3 A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-, \pi^+\pi^-\pi^0, \pi^0\gamma, \eta\gamma$ data.

NODE=M001G;LINKAGE=SH

NODE=M001G4;LINKAGE=LP

NODE=M001G4;LINKAGE=BE

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_9/\Gamma \times \Gamma_3/\Gamma$
1.225±0.058±0.041 800k					
1.225±0.058±0.041	800k	1 ACHASOV 06	SND	$e^+e^- \rightarrow \pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.146±0.057		2 BENAYOUN 10	RVUE	$0.4-1.05 e^+e^-$	

1 Supersedes ACHASOV 05A.

2 A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-, \pi^+\pi^-\pi^0, \pi^0\gamma, \eta\gamma$ data.

NODE=M001G5;LINKAGE=AC

NODE=M001G5;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{\text{total}} \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}$	$\Gamma_9/\Gamma \times \Gamma_5/\Gamma$			
VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
3.32±0.28 OUR FIT	Error includes scale factor of 1.1.			
3.18±0.28 OUR AVERAGE				
3.10±0.31±0.11	33k	1 ACHASOV	07B SND	$0.6-1.38 e^+e^- \rightarrow \eta\gamma$
$3.17^{+1.85}_{-1.31} \pm 0.21$	17.4k	2 AKHMETSHIN 05	CMD2	$0.60-1.38 e^+e^- \rightarrow \eta\gamma$
3.41±0.52±0.21	23k	3,4 AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.50±0.10		5 BENAYOUN	10 RVUE	$0.4-1.05 e^+e^-$
1 From a combined fit of $\sigma(e^+e^- \rightarrow \eta\gamma)$ with $\eta \rightarrow 3\pi^0$ and $\eta \rightarrow \pi^+\pi^-\pi^0$, and fixing $B(\eta \rightarrow 3\pi^0) / B(\eta \rightarrow \pi^+\pi^-\pi^0) = 1.44 \pm 0.04$. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00b and ACHASOV 06A.				
2 From the $\eta \rightarrow 2\gamma$ decay and using $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.				
3 From the $\eta \rightarrow 3\pi^0$ decay and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$.				
4 The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively).				
5 A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-, \pi^+\pi^-\pi^0, \pi^0\gamma, \eta\gamma$ data.				

NODE=M001G3
NODE=M001G3

$\omega(782)$ BRANCHING RATIOS	Γ_1/Γ			
$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$	Γ_1/Γ			
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.9024±0.0019		1 AMBROSINO 08G	KLOE	$1.0-1.03 e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$
$0.8965 \pm 0.0016 \pm 0.0048$	1.2M	2,3 ACHASOV	03D RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.880 ± 0.020 ± 0.032	11200	3,4 AKHMETSHIN 00C	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.8942±0.0062		3 DOLINSKY	89 ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
1 Not independent of $\Gamma(\pi^0\gamma) / \Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G.				
2 Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.				
3 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}^2$.				
4 Using $\Gamma(e^+e^-) = 0.60 \pm 0.02$ keV.				
$\Gamma(\pi^0\gamma)/\Gamma_{\text{total}}$	Γ_2/Γ			
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8.09±0.14		1 AMBROSINO 08G	KLOE	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$
$9.06 \pm 0.20 \pm 0.57$	18680	2,3 AKHMETSHIN 05	CMD2	$0.60-1.38 e^+e^- \rightarrow \pi^0\gamma$
9.34±0.15±0.31	36500	3 ACHASOV	03 SND	$0.60-0.97 e^+e^- \rightarrow \pi^0\gamma$
8.65±0.16±0.42	1.2M	4,5 ACHASOV	03D RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.39±0.24	9975	6 BENAYOUN	96 RVUE	$e^+e^- \rightarrow \pi^0\gamma$
8.88±0.62	10625	3 DOLINSKY	89 ND	$e^+e^- \rightarrow \pi^0\gamma$
1 Not independent of $\Gamma(\pi^0\gamma) / \Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G.				
2 Using $B(\omega \rightarrow e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$.				
3 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}^2$.				
4 Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.				
5 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}^2$.				
6 Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.				
$\Gamma(\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$	Γ_2/Γ_1			
VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT	
9.28±0.31 OUR FIT	Error includes scale factor of 2.3.			
9.05±0.27 OUR AVERAGE	Error includes scale factor of 1.8.			
8.97±0.16		AMBROSINO 08G	KLOE	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$
$9.94 \pm 0.36 \pm 0.38$	1 AULCHENKO 00A	SND	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$	
8.4 ± 1.3	KEYNE	76 CNTR	$\pi^- p \rightarrow \omega n$	
10.9 ± 2.5	BENAKSAS	72C OSPK	$e^+e^- \rightarrow \pi^0\gamma$	
8.1 ± 2.0	BALDIN	71 HLBC	$2.9 \pi^+ p$	
13 ± 4	JACQUET	69B HLBC	$2.05 \pi^+ p \rightarrow \pi^+ p\omega$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
9.7 ± 0.2 ± 0.5	2,3 ACHASOV	03D RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
9.9 ± 0.7	2 DOLINSKY	89 ND	$e^+e^- \rightarrow \pi^0\gamma$	

NODE=M001R28
NODE=M001R28

NODE=M001R28;LINKAGE=AM
NODE=M001R;LINKAGE=AH
NODE=M001R;LINKAGE=VL
NODE=M001R28;LINKAGE=VF
NODE=M001R28;LINKAGE=ZL
NODE=M001R28;LINKAGE=A1

NODE=M001R3
NODE=M001R3

¹ From $\sigma_0^{\omega\pi^0} \rightarrow \pi^0\pi^0\gamma(m_\phi)/\sigma_0^{\omega\pi^0} \rightarrow \pi^+\pi^-\pi^0(m_\phi)$ with a phase-space correction factor of 1/1.023.

² Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}^2$.

³ Using ACHASOV 03. Based on 1.2M events.

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$

See also $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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1.53^{+0.11}_{-0.13} OUR FIT Error includes scale factor of 1.2.

1.49^{+0.13}_{-0.13} OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

$1.46 \pm 0.12 \pm 0.02$	900k	1 AKHMETSHIN 07	$e^+e^- \rightarrow \pi^+\pi^-$
$1.30 \pm 0.24 \pm 0.05$	11.2k	2 AKHMETSHIN 04	$e^+e^- \rightarrow \pi^+\pi^-$
$2.38^{+1.77}_{-0.90} \pm 0.18$	5.4k	3 ACHASOV 02E	$SND \quad 1.1-1.38 \quad e^+e^- \rightarrow \pi^+\pi^-\pi^0$
2.3 ± 0.5		BARKOV 85	$e^+e^- \rightarrow \pi^+\pi^-$
$1.6^{+0.9}_{-0.7}$		QUENZER 78	$e^+e^- \rightarrow \pi^+\pi^-$
3.6 ± 1.9		BENAKSAS 72	$e^+e^- \rightarrow \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.75 ± 0.11	4.5M	4 ACHASOV 05A	$SND \quad e^+e^- \rightarrow \pi^+\pi^-$
2.01 ± 0.29		5 BENAYOUN 03	$RVUE \quad e^+e^- \rightarrow \pi^+\pi^-$
1.9 ± 0.3		6 GARDNER 99	$RVUE \quad e^+e^- \rightarrow \pi^+\pi^-$
2.3 ± 0.4		7 BENAYOUN 98	$RVUE \quad e^+e^- \rightarrow \pi^+\pi^-, \mu^+\mu^-$
1.0 ± 0.11		8 WICKLUND 78	$ASPK \quad 3,4,6 \pi^\pm N$
1.22 ± 0.30		ALVENSLEB... 71C	CNTR Photoproduction
$1.3^{+1.2}_{-0.9}$		MOFFEIT 71	HBC $2.8,4.7 \gamma p$
$0.80^{+0.28}_{-0.20}$		9 BIGGS 70B	CNTR $4.2\gamma C \rightarrow \pi^+\pi^- C$

¹ A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05.

² Update of AKHMETSHIN 02.

³ From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes.

⁴ Using $\Gamma(\omega \rightarrow e^+e^-)$ from the 2004 Edition of this Review (PDG 04).

⁵ Using the data of AKHMETSHIN 02 in the hidden local symmetry model.

⁶ Using the data of BARKOV 85.

⁷ Using the data of BARKOV 85 in the hidden local symmetry model.

⁸ From a model-dependent analysis assuming complete coherence.

⁹ Re-evaluated under $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ by BEHREND 71 using more accurate $\omega \rightarrow \rho$ photoproduction cross-section ratio.

NODE=M001R3;LINKAGE=AL

NODE=M001R3;LINKAGE=VL

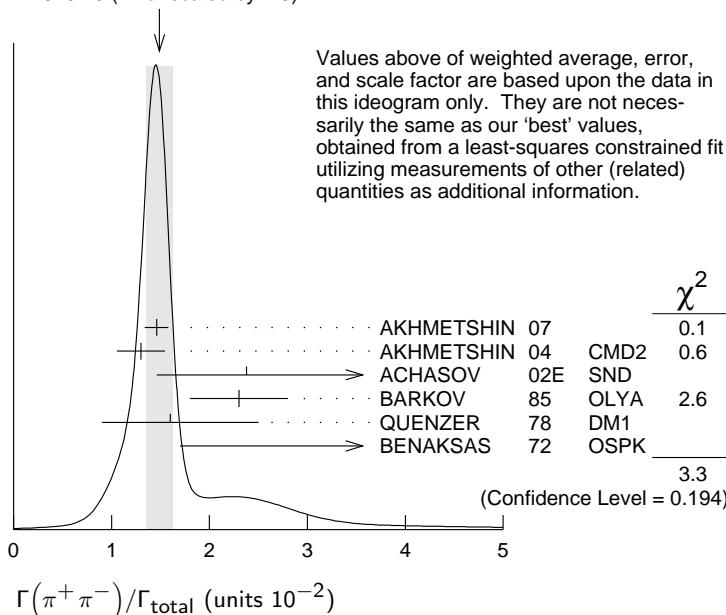
NODE=M001R3;LINKAGE=VV

NODE=M001R15

NODE=M001R15

NODE=M001R15

WEIGHTED AVERAGE
1.49^{+0.13}_{-0.13} (Error scaled by 1.3)



$\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ See also $\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$.

VALUE		DOCUMENT ID	TECN	COMMENT
0.0172±0.0014 OUR FIT	Error includes scale factor of 1.2.			
0.026 ± 0.005 OUR AVERAGE				
0.021 +0.028 -0.009	1,2 RATCLIFF	72 ASPK	15 $\pi^- p \rightarrow n2\pi$	
0.028 ± 0.006	1 BEHREND	71 ASPK	Photoproduction	
0.022 +0.009 -0.011	3 ROOS	70 RVUE		

1 The fitted width of these data is 160 MeV in agreement with present average, thus the ω contribution is overestimated. Assuming ρ width 145 MeV.

2 Significant interference effect observed. NB of $\omega \rightarrow 3\pi$ comes from an extrapolation.
 3 ROOS 70 combines ABRAMOVICH 70 and BIZZARRI 70.

 $\Gamma(\pi^+\pi^-)/\Gamma(\pi^0\gamma)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.20±0.04	1.98M	1 ALOISIO	03 KLOE	$1.02 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$

1 Using the data of ALOISIO 02D.

 $\Gamma(\text{ neutrals})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.091±0.006 OUR FIT				
0.081±0.011 OUR AVERAGE				
0.075±0.025	BIZZARRI	71 HBC	0.0 $p\bar{p}$	
0.079±0.019	DEINET	69B OSPK	1.5 $\pi^- p$	
0.084±0.015	BOLLINI	68C CNTR	2.1 $\pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.073±0.018	42 BASILE	72B CNTR	1.67 $\pi^- p$	

 $(\Gamma_2+\Gamma_4)/\Gamma_1$

NODE=M001R2;LINKAGE=A

NODE=M001R2;LINKAGE=S
NODE=M001R2;LINKAGE=RNODE=M001R33
NODE=M001R33

NODE=M001R;LINKAGE=KL

NODE=M001R14
NODE=M001R33 $\Gamma(\text{ neutrals})/\Gamma(\pi^+\pi^-\pi^0)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.102±0.008 OUR FIT				
0.103 +0.011 -0.010 OUR AVERAGE				
0.15 ± 0.04	46 AGUILAR-...	72B HBC	3.9,4.6 $K^- p$	
0.10 ± 0.03	19 BARASH	67B HBC	0.0 $\bar{p}p$	
0.134±0.026	850 DIGUGNO	66B CNTR	1.4 $\pi^- p$	
0.097±0.016	348 FLATTE	66 HBC	1.4 – 1.7 $K^- p \rightarrow \Lambda MM$	
0.06 +0.05 -0.02	JAMES	66 HBC	2.1 $\pi^+ p$	
0.08 ± 0.03	35 KRAEMER	64 DBC	1.2 $\pi^+ d$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.11 ± 0.02	20 BUSCHBECK	63 HBC	1.5 $K^- p$	

 $(\Gamma_2+\Gamma_4)/\Gamma_1$ NODE=M001R1
NODE=M001R1 $\Gamma(\pi^0\gamma)/\Gamma(\text{ neutrals})$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.78±0.07	1 DAKIN	72 OSPK	1.4 $\pi^- p \rightarrow n MM$	
>0.81	90 DEINET	69B OSPK		

1 Error statistical only. Authors obtain good fit also assuming $\pi^0\gamma$ as the only neutral decay.

 $\Gamma_2/(\Gamma_2+\Gamma_4)$ NODE=M001R18
NODE=M001R18 $\Gamma(\text{ neutrals})/\Gamma(\text{ charged particles})$

VALUE		DOCUMENT ID	TECN	COMMENT
0.100±0.008 OUR FIT				
0.124±0.021		FELDMAN	67C OSPK	1.2 $\pi^- p$

 $(\Gamma_2+\Gamma_4)/(\Gamma_1+\Gamma_3)$ NODE=M001R9
NODE=M001R9 $\Gamma(\eta\gamma)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.6 ± 0.4 OUR FIT				Error includes scale factor of 1.1.
6.3 ± 1.3 OUR AVERAGE				Error includes scale factor of 1.2.
6.6 ± 1.7	1 ABELE	97E CBAR	0.0 $\bar{p}p \rightarrow 5\gamma$	
8.3 ± 2.1	ALDE	93 GAM2	38 $\pi^- p \rightarrow \omega n$	
3.0 +2.5 -1.8	2 ANDREWS	77 CNTR	6.7–10 γCu	

 Γ_5/Γ NODE=M001R19
NODE=M001R19

• • • We do not use the following data for averages, fits, limits, etc. • • •

4.3 ± 0.5	± 0.1	33k	ACHASOV	07B	SND	0.6–1.38	$e^+ e^- \rightarrow \eta\gamma$
4.44 ± 2.59	± 0.28	17.4k	AKHMETSHIN 05	CMD2	0.60–1.38	$e^+ e^- \rightarrow \eta\gamma$	
5.10 ± 0.72	± 0.34	23k	AKHMETSHIN 01B	CMD2	$e^+ e^- \rightarrow \eta\gamma$		
0.7 to 5.5			CASE	00	CBAR	0.0 $p\bar{p}$	$\rightarrow \eta\eta\gamma$
6.56 ± 2.41	± 2.55	3525	BENAYOUN	96	RVUE	$e^+ e^- \rightarrow \eta\gamma$	
7.3 ± 2.9			DOLINSKY	89	ND	$e^+ e^- \rightarrow \eta\gamma$	

1 No flat $\eta\eta\gamma$ background assumed.

2 Solution corresponding to constructive ω - ρ interference.

3 ACHASOV 07B reports $[\Gamma(\omega(782) \rightarrow \eta\gamma)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow e^+ e^-)] = (3.10 \pm 0.31 \pm 0.11) \times 10^{-8}$ which we divide by our best value $B(\omega(782) \rightarrow e^+ e^-) = (7.28 \pm 0.14) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Supersedes ACHASOV 00D and ACHASOV 06A.

4 Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}$.

5 Using $B(\omega \rightarrow e^+ e^-) = (7.14 \pm 0.13) \times 10^{-5}$ and $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.

6 Using $B(\omega \rightarrow e^+ e^-) = (7.07 \pm 0.19) \times 10^{-5}$ and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$. Solution corresponding to constructive ω - ρ interference. The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}$.

7 Depending on the degree of coherence with the flat $\eta\eta\gamma$ background and using $B(\omega \rightarrow \pi^0\gamma) = (8.5 \pm 0.5) \times 10^{-2}$.

8 Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT	Γ_5/Γ_2
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0098 ± 0.0024	1 ALDE	93	GAM2	$38\pi^- p \rightarrow \omega n$
0.0082 ± 0.0033	2 DOLINSKY	89	ND	$e^+ e^- \rightarrow \eta\gamma$
0.010 ± 0.045	APEL	72B	OSPK	$4\text{--}8 \pi^- p \rightarrow n3\gamma$

1 Model independent determination.

2 Solution corresponding to constructive ω - ρ interference.

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_6/Γ
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7.7 ± 0.6 OUR FIT

7.7 ± 0.6 OUR AVERAGE

7.61 $\pm 0.53 \pm 0.64$		ACHASOV	08	SND	$0.36\text{--}0.97 e^+ e^- \rightarrow \pi^0 e^+ e^-$
8.19 $\pm 0.71 \pm 0.62$		AKHMETSHIN 05A	CMD2	$0.72\text{--}0.84 e^+ e^-$	
5.9 ± 1.9	43	DOLINSKY	88	ND	$e^+ e^- \rightarrow \pi^0 e^+ e^-$

$\Gamma(\pi^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_7/Γ
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1.3 ± 0.4 OUR FIT Error includes scale factor of 2.1.

1.3 ± 0.4 OUR AVERAGE Error includes scale factor of 2.1.

1.72 $\pm 0.25 \pm 0.14$	3k	ARNALDI	09	NA60	158A In–In collisions
0.96 ± 0.23		DZHELYADIN	81B	CNTR	$25\text{--}33 \pi^- p \rightarrow \omega n$

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT	Γ_8/Γ
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.1		AKHMETSHIN 05A	CMD2	$0.72\text{--}0.84 e^+ e^-$
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$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_9/Γ
--------------------------	------	-------------	------	---------	-------------------

0.728 ± 0.014 OUR FIT Error includes scale factor of 1.3.

• • • We do not use the following data for averages, fits, limits, etc. • • •

NODE=M001R;LINKAGE=EA

NODE=M001R19;LINKAGE=A

NODE=M001R19;LINKAGE=AO

NODE=M001R13;LINKAGE=WL

NODE=M001R19;LINKAGE=AK

NODE=M001R19;LINKAGE=TS

NODE=M001R;LINKAGE=CS

NODE=M001R19;LINKAGE=A1

NODE=M001R11

NODE=M001R11

NODE=M001R11;LINKAGE=A

NODE=M001R11;LINKAGE=K

NODE=M001R23

NODE=M001R23

NODE=M001R12

NODE=M001R12

NODE=M001R34

NODE=M001R34

NODE=M001R13

NODE=M001R13

0.700±0.016	11200	1,2 AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.752±0.004±0.024	1.2M	2,3 ACHASOV 03D	RVUE	$0.44\text{--}2.00 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.714±0.036		2 DOLINSKY 89	ND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.72 ± 0.03		2 BARKOV 87	CMD	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.64 ± 0.04	1488	2 KURDADZE 83B	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.675±0.069	433	2 CORDIER 80	DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.83 ± 0.10	451	2 BENAKSAS 72B	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.77 ± 0.06		4 AUGUSTIN 69D	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.65 ± 0.13	33	5 ASTVACAT...	68 OSPK	Assume SU(3)+mixing

1 Using $B(\omega \rightarrow \pi^+ \pi^- \pi^0) = 0.891 \pm 0.007$. Update of AKHMETSHIN 00C.

2 Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}^2$.

3 Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+ \pi^-) = (1.70 \pm 0.28)\%$.

4 Rescaled by us to correspond to ω width 8.4 MeV. Systematic errors underestimated.

5 Not resolved from ρ decay. Error statistical only.

$\Gamma(\pi^+ \pi^- \pi^0 \pi^0)/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 2	90	ACHASOV 09A	SND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \pi^0$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<200	90	KURDADZE 86	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \pi^0$

$\Gamma(\pi^+ \pi^- \gamma)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0036	95	WEIDENAUER 90	ASTE	$p\bar{p} \rightarrow \pi^+ \pi^- \pi^+ \pi^- \gamma$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.004	95	BITYUKOV 88B	SPEC	$32 \pi^- p \rightarrow \pi^+ \pi^- \gamma X$

$\Gamma(\pi^+ \pi^- \gamma)/\Gamma(\pi^+ \pi^- \pi^0)$ Γ_{11}/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.066	90	KALBFLEISCH 75	HBC	$2.18 K^- p \rightarrow \Lambda \pi^+ \pi^- \gamma$
<0.05	90	FLATTE 66	HBC	$1.2 - 1.7 K^- p \rightarrow \Lambda \pi^+ \pi^- \gamma$

$\Gamma(\pi^+ \pi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1 × 10 ⁻³	90	KURDADZE 88	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^+ \pi^-$

$\Gamma(\pi^0 \pi^0 \gamma)/\Gamma_{\text{total}}$ Γ_{13}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
6.6±1.1 OUR FIT				
6.5±1.2 OUR AVERAGE				

6.4 ^{+2.4} _{-2.0} ±0.8	190	1 AKHMETSHIN 04B	CMD2	$0.6\text{--}0.97 e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
6.6 ^{+1.4} _{-1.3} ±0.6	295	ACHASOV 02F	SND	$0.36\text{--}0.97 e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$

$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$

11.8 ^{+2.1} _{-1.9} ±1.4	190	2 AKHMETSHIN 04B	CMD2	$0.6\text{--}0.97 e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
7.8±2.7±2.0	63	1,3 ACHASOV 00G	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
12.7±2.3±2.5	63	2,3 ACHASOV 00G	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$

1 In the model assuming the $\rho \rightarrow \pi^0 \pi^0 \gamma$ decay via the $\omega \pi$ and $f_0(500) \gamma$ mechanisms.

2 In the model assuming the $\rho \rightarrow \pi^0 \pi^0 \gamma$ decay via the $\omega \pi$ mechanism only.

3 Superseded by ACHASOV 02F.

NODE=M001R13;LINKAGE=4P
NODE=M001R13;LINKAGE=ZL
NODE=M001R13;LINKAGE=VF
NODE=M001R13;LINKAGE=E
NODE=M001R13;LINKAGE=A

NODE=M001R5
NODE=M001R5

NODE=M001R22
NODE=M001R22

NODE=M001R4
NODE=M001R4

NODE=M001R24
NODE=M001R24

NODE=M001R29
NODE=M001R29

OCCUR=2

OCCUR=2

NODE=M001R29;LINKAGE=A
NODE=M001R29;LINKAGE=B
NODE=M001R;LINKAGE=GF

NODE=M001R10
NODE=M001R10

$\Gamma(\pi^0 \pi^0 \gamma)/\Gamma(\pi^+ \pi^- \pi^0)$ Γ_{13}/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.00045	90	DOLINSKY 89	ND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$

$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$

<0.08	95	JACQUET 69B	HLBC	$2.05 \pi^+ p \rightarrow \pi^+ p\omega$
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$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$

<u>VALUE</u> (units 10^{-4})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
8.0 ± 1.3 OUR FIT					
8.5 ± 2.9		40 ± 14	ALDE	94B GAM2	$38\pi^- p \rightarrow \pi^0\pi^0\gamma n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 50	90		DOLINSKY	89 ND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
<1800	95		KEYNE	76 CNTR	$\pi^- p \rightarrow \omega n$
<1500	90		BENAKSAS	72C OSPK	e^+e^-
<1400			BALDIN	71 HLBC	$2.9\pi^+ p$
<1000	90		BARMIN	64 HLBC	$1.3-2.8\pi^- p$

 Γ_{13}/Γ_2 NODE=M001R7
NODE=M001R7 $\Gamma(\pi^0\pi^0\gamma)/\Gamma(\text{ neutrals})$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.22 \pm 0.07		¹ DAKIN	72 OSPK	$1.4\pi^- p \rightarrow n\text{MM}$
<0.19	90	DEINET	69B OSPK	

 $\Gamma_{13}/(\Gamma_2+\Gamma_4)$ NODE=M001R17
NODE=M001R17 $\Gamma(\eta\pi^0\gamma)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<3.3	90	AKHMETSHIN 04B	CMD2	$0.6-0.97\pi^0\gamma \rightarrow \eta\pi^0\gamma$

 Γ_{14}/Γ NODE=M001R32
NODE=M001R32 $\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
9.0\pm3.1 OUR FIT				
$9.0 \pm 2.9 \pm 1.1$	18	HEISTER	02C ALEP	$Z \rightarrow \mu^+\mu^- + X$

 Γ_{15}/Γ NODE=M001R30
NODE=M001R30 $\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$

<u>VALUE</u> (units 10^{-3})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.2	90	WILSON	69 OSPK	$12\pi^- C \rightarrow Fe$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.7	74	FLATTE	66 HBC	$1.2-1.7K^- p \rightarrow \Lambda\mu^+\mu^-$
<1.2		BARBARO-...	65 HBC	$2.7K^- p$

 Γ_{15}/Γ_1 NODE=M001R6
NODE=M001R6 $\Gamma(\pi^0\mu^+\mu^-)/\Gamma(\mu^+\mu^-)$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.2 \pm 0.6	30	¹ DZHELYADIN	79 CNTR	$25-33\pi^- p$

 Γ_7/Γ_{15} NODE=M001R20
NODE=M001R20

1 Superseded by DZHELYADIN 81B result above.

 $\Gamma(3\gamma)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-4})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.9	95	¹ ABELE	97E CBAR	$0.0\bar{p}p \rightarrow 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<2	90	¹ PROKOSHKIN	95 GAM2	$38\pi^- p \rightarrow 3\gamma n$

 Γ_{16}/Γ NODE=M001R27
NODE=M001R271 From direct 3γ decay search. $\Gamma(\eta\pi^0)/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.001	90	ALDE	94B GAM2	$38\pi^- p \rightarrow \eta\pi^0n$

 Γ_{17}/Γ NODE=M001R25
NODE=M001R25
NODE=M001R25 $[\Gamma(\eta\gamma) + \Gamma(\eta\pi^0)]/\Gamma(\pi^+\pi^-\pi^0)$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.016	90	¹ FLATTE	66 HBC	$1.2-1.7K^- p \rightarrow \Lambda\pi^+\pi^- MM$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.045	95	JACQUET	69B HLBC	$2.05\pi^+ p \rightarrow \pi^+ p\omega$

 $(\Gamma_5 + \Gamma_{17})/\Gamma_1$ NODE=M001R8
NODE=M001R81 Restated by us using $B(\eta \rightarrow \text{charged modes}) = 29.2\%$.

NODE=M001R8;LINKAGE=A

$\Gamma(\eta\pi^0)/\Gamma(\pi^0\gamma)$ Violates C conservation.

<u>VALUE</u> (units 10^{-3})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<2.6	90	1 STAROSTIN 09	CRYM	$\gamma p \rightarrow \eta\pi^0 p$

1 STAROSTIN 09 reports $[\Gamma(\omega(782) \rightarrow \eta\pi^0)/\Gamma(\omega(782) \rightarrow \pi^0\gamma)] \times [B(\eta \rightarrow 2\gamma)] < 1.01 \times 10^{-3}$ which we divide by our best value $B(\eta \rightarrow 2\gamma) = 39.41 \times 10^{-2}$.

 Γ_{17}/Γ_2

NODE=M001R35
NODE=M001R35
NODE=M001R35

NODE=M001R35;LINKAGE=ST

 $\Gamma(2\pi^0)/\Gamma(\pi^0\gamma)$ Violates C conservation and Bose-Einstein statistics.

<u>VALUE</u> (units 10^{-3})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<2.59	90	STAROSTIN 09	CRYM	$\gamma p \rightarrow 2\pi^0 p$

 Γ_{18}/Γ_2

NODE=M001R36
NODE=M001R36
NODE=M001R36

 $\Gamma(3\pi^0)/\Gamma_{\text{total}}$ Violates C conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				

 $<3 \times 10^{-4}$ 90 PROKOSHKIN 95 GAM2 38 $\pi^- p \rightarrow 3\pi^0 n$ Γ_{19}/Γ

NODE=M001R26
NODE=M001R26
NODE=M001R26

 $\Gamma(3\pi^0)/\Gamma(\pi^0\gamma)$ Violates C conservation.

<u>VALUE</u> (units 10^{-3})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<2.72	90	STAROSTIN 09	CRYM	$\gamma p \rightarrow 3\pi^0 p$

 Γ_{19}/Γ_2

NODE=M001R37
NODE=M001R37
NODE=M001R37

 $\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ Violates C conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			

<0.009

90 BARBERIS 01 450 $pp \rightarrow p_f 3\pi^0 p_s$ Γ_{19}/Γ_1

NODE=M001R31
NODE=M001R31
NODE=M001R31

PARAMETER Λ IN $\omega \rightarrow \pi^0\mu^+\mu^-$ DECAYIn the pole approximation the electromagnetic transition form factor for a resonance of mass M is given by the expression:

$|F|^2 = (1 - M^2/\Lambda^2)^{-2},$

where for the parameter Λ vector dominance predicts $\Lambda = M_p \approx 0.770$ GeV. The ARNALDI 09 measurement is in obvious conflict with this expectation. Note that for $\eta \rightarrow \mu^+\mu^-\gamma$ decay ARNALDI 09 and DZHELYADIN 80 obtain the value of Λ consistent with vector dominance.

<u>VALUE</u> (GeV)	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.668 ± 0.009 ± 0.003	3k	ARNALDI 09	NA60	158A In-In collisions

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.65 ± 0.03 DZHELYADIN 81B CNTR 25–33 $\pi^- p \rightarrow \omega n$

NODE=M001LAM
NODE=M001LAM

NODE=M001LAM

 $\omega(782)$ REFERENCES

LEES 12G	PR D86 032013	J.P. Lees <i>et al.</i>	(BABAR Collab.)
NIECKNIG 12	EPJ C72 2014	F. Niecknig, B. Kubis, S.P. Schneider	(BONN)
BENAYOUN 10	EPJ C65 211	M. Benayoun <i>et al.</i>	
ACHASOV 09A	JETP 109 379	M.N. Achasov <i>et al.</i>	(SND Collab.)
	Translated from ZETF 136 442.		
ARNALDI 09	PL B677 260	R. Arnaldi <i>et al.</i>	(NA60 Collab.)
STAROSTIN 09	PR C79 065201	A. Starostin <i>et al.</i>	(Crystal Ball Collab. at MAMI)
ACHASOV 08	JETP 107 61	M.N. Achasov <i>et al.</i>	(SND Collab.)
	Translated from ZETF 134 80.		
AMBROSINO 08G	PL B669 223	F. Ambrosino <i>et al.</i>	(KLOE Collab.)
ACHASOV 07B	PR D76 077101	M.N. Achasov <i>et al.</i>	(SND Collab.)
AKHMETSHIN 07	PL B648 28	R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ACHASOV 06	JETP 103 380	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
	Translated from ZETF 130 437.		
ACHASOV 06A	PR D74 014016	M.N. Achasov <i>et al.</i>	(SND Collab.)
AULCHENKO 06	JETPL 84 413	V.M. Aulchenko <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ACHASOV 05A	JETP 101 1053	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
	Translated from ZETF 128 1201.		
AKHMETSHIN 05	PL B605 26	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN 05A	PL B613 29	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AULCHENKO 05	JETPL 82 743	V.M. Aulchenko <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
	Translated from ZETFP 82 841.		

NODE=M001

REFID=54299
REFID=54305
REFID=53212
REFID=53101

REFID=52720
REFID=53001
REFID=52258

REFID=52573
REFID=51942
REFID=51615
REFID=51113

REFID=51133
REFID=51513

REFID=51045

REFID=50330
REFID=50508
REFID=51060

AKHMETSHIN	04	PL	B578	285	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)	REFID=49609
AKHMETSHIN	04B	PL	B580	119	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)	REFID=49610
AUBERT,B	04N	PR	D70	072004	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=50184
PDG	04	PL	B592	1	S. Eidelman <i>et al.</i>	(PDG Collab.)	REFID=49653
ACHASOV	03	PL	B559	171	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=49187
ACHASOV	03D	PR	D68	052006	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=49577
ALOISIO	03	PL	B561	55	A. Aloisio <i>et al.</i>	(KLOE Collab.)	REFID=49404
BENAYOUN	03	EPJ	C29	397	M. Benayoun <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=49477
ACHASOV	02E	PR	D66	032001	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=48815
ACHASOV	02F	PL	B537	201	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=48816
AKHMETSHIN	02	PL	B527	161	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)	REFID=48565
ALOISIO	02D	PL	B537	21	A. Aloisio <i>et al.</i>	(KLOE Collab.)	REFID=48824
HEISTER	02C	PL	B528	19	A. Heister <i>et al.</i>	(ALEPH Collab.)	REFID=48564
ACHASOV	01E	PR	D63	072002	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=48311
AKHMETSHIN	01B	PL	B509	217	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)	REFID=48167
BARBERIS	01	PL	B507	14	D. Barberis <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=48324
ACHASOV	00	EPJ	C12	25	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=47417
ACHASOV	00D	JETPL	72	282	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=47882
ACHASOV	00G	JETPL	71	355	Translated from ZETFP 72, 411. M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=47929
ACHASOV	00G	JETPL	71	355	Translated from ZETFP 71, 519. M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=47423
AKHMETSHIN	00C	PL	B476	33	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=47953
AULCHENKO	00A	JETP	90	927	V.M. Aulchenko <i>et al.</i>		
					Translated from ZETFP 117, 1067.		
CASE	00	PR	D61	032002	T. Case <i>et al.</i>	(Crystal Barrel Collab.)	REFID=47409
ACHASOV	99E	PL	B462	365	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=47391
GARDNER	99	PR	D59	076002	S. Gardner, H.B. O'Connell		REFID=46919
BENAYOUN	98	EPJ	C2	269	M. Benayoun <i>et al.</i>	(IPNP, NOVO, ADLD+)	REFID=45859
ABELE	97E	PL	B411	361	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)	REFID=45755
BENAYOUN	96	ZPHY	C72	221	M. Benayoun <i>et al.</i>	(IPNP, NOVO)	REFID=45753
PROKOSHKIN	95	SPD	40	273	Y.D. Prokoshkin, V.D. Samoilenko	(SERP)	REFID=44616
					Translated from DANS 342, 610.		
WURZINGER	95	PR	C51	443	R. Wurzinger <i>et al.</i>	(BONN, ORSAY, SACL+)	REFID=45209
ALDE	94B	PL	B340	122	D.M. Alde <i>et al.</i>	(SERP, BELG, LANL, LAPP+)	REFID=44100
AMSLER	94C	PL	B327	425	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)	REFID=44091
ALDE	93	PAN	56	1229	D.M. Alde <i>et al.</i>	(SERP, LAPP, LANL, BELG+)	REFID=43603
					Translated from YAF 56, 137.		
Also		ZPHY	C61	35	D.M. Alde <i>et al.</i>	(SERP, LAPP, LANL, BELG+)	REFID=43790
AMSLER	93B	PL	B311	362	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)	REFID=43602
WEIDENAUER	93	ZPHY	C59	387	P. Weidenauer <i>et al.</i>	(ASTERIX Collab.)	REFID=43585
ANTONELLI	92	ZPHY	C56	15	A. Antonelli <i>et al.</i>	(DM2 Collab.)	REFID=43168
DOLINSKY	91	PRPL	202	99	S.I. Dolinsky <i>et al.</i>	(NOVO)	REFID=41369
WEIDENAUER	90	ZPHY	C47	353	P. Weidenauer <i>et al.</i>	(ASTERIX Collab.)	REFID=41368
DOLINSKY	89	ZPHY	C42	511	S.I. Dolinsky <i>et al.</i>	(NOVO)	REFID=41003
BITYUKOV	88B	SJNP	47	800	S.I. Bityukov <i>et al.</i>	(SERP)	REFID=41021
					Translated from YAF 47, 1258.		
DOLINSKY	88	SJNP	48	277	S.I. Dolinsky <i>et al.</i>	(NOVO)	REFID=41022
					Translated from YAF 48, 442.		
KURDADZE	88	JETPL	47	512	L.M. Kurdadze <i>et al.</i>	(NOVO)	REFID=41121
					Translated from ZETFP 47, 432.		
AULCHENKO	87	PL	B186	432	V.M. Aulchenko <i>et al.</i>	(NOVO)	REFID=40007
BARKOV	87	JETPL	46	164	L.M. Barkov <i>et al.</i>	(NOVO)	REFID=40280
					Translated from ZETFP 46, 132.		
KURDADZE	86	JETPL	43	643	L.M. Kurdadze <i>et al.</i>	(NOVO)	REFID=40287
					Translated from ZETFP 43, 497.		
BARKOV	85	NP	B256	365	L.M. Barkov <i>et al.</i>	(NOVO)	REFID=20134
DRUZHININ	84	PL	144B	136	V.P. Druzhinin <i>et al.</i>	(NOVO)	REFID=20561
KURDADZE	83B	JETPL	36	274	A.M. Kurdadze <i>et al.</i>	(NOVO)	REFID=20244
					Translated from ZETFP 36, 221.		
DZHELYADIN	81B	PL	102B	296	R.I. Dzheleyadin <i>et al.</i>	(SERP)	REFID=20242
CORDIER	80	NP	B172	13	A. Cordier <i>et al.</i>	(LALO)	REFID=20240
DZHELYADIN	80	PL	94B	548	R.I. Dzheleyadin <i>et al.</i>	(SERP)	REFID=10831
ROOS	80	LNC	27	321	M. Roos, A. Pellinen	(HELS)	REFID=20241
BENKHEIRI	79	NP	B150	268	P. Benkhieri <i>et al.</i>	(EPOL, CERN, CDEF+)	REFID=20238
DZHELYADIN	79	PL	84B	143	R.I. Dzheleyadin <i>et al.</i>	(SERP)	REFID=20239
COOPER	78B	NP	B146	1	A.M. Cooper <i>et al.</i>	(TATA, CERN, CDEF+)	REFID=20235
QUENZER	78	PL	76B	512	A. Quenzer <i>et al.</i>	(LALO)	REFID=20123
VANAPEL...	78	NP	B133	245	G.W. van Apeldoorn <i>et al.</i>	(ZEEM)	REFID=20234
WICKLUND	78	PR	D17	1197	A.B. Wicklund <i>et al.</i>	(ANL)	REFID=20124
ANDREWS	77	PRL	38	198	D.E. Andrews <i>et al.</i>	(ROCH)	REFID=20120
GESSAROLI	77	NP	B126	382	R. Gessaroli <i>et al.</i>	(BGNA, FIRZ, GENO+)	REFID=20230
KEYNE	76	PR	D14	28	J. Keyne <i>et al.</i>	(LOIC, SHMP)	REFID=20226
Also		PR	D8	2789	D.M. Binnie <i>et al.</i>	(LOIC, SHMP)	REFID=20216
KALBFLEISCH	75	PR	D11	987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)	REFID=20223
AGUILAR...	72B	PL	D6	29	M. Aguilar-Benitez <i>et al.</i>	(BNL)	REFID=20205
APEL	72B	PL	41B	234	W.D. Apel <i>et al.</i>	(KARLK, KARLE, PISA)	REFID=20206
BASILE	72B	Phil.	Conf.	153	M. Basile <i>et al.</i>	(CERN)	REFID=20207
BENAKSAS	72	PL	39B	289	D. Benakas <i>et al.</i>	(ORSAY)	REFID=20096
BENAKSAS	72B	PL	42B	507	D. Benakas <i>et al.</i>	(ORSAY)	REFID=20209
BENAKSAS	72C	PL	42B	511	D. Benakas <i>et al.</i>	(ORSAY)	REFID=20517
BORENSTEIN	72	PR	D5	1559	S.R. Borenstein <i>et al.</i>	(BNL, MICH)	REFID=20215
BROWN	72	PL	42B	117	R.M. Brown <i>et al.</i>	(ILL, ILLC)	REFID=20211
DAKIN	72	PR	D6	2321	J.I. Dakin <i>et al.</i>	(PRIN)	REFID=20212
RATCLIFF	72	PL	38B	345	B.N. Ratcliff <i>et al.</i>	(SLAC)	REFID=20102
ALVENSLEB...	71C	PRL	27	888	H. Alvensleben <i>et al.</i>	(DESY)	REFID=20193
BALDIN	71	SJNP	13	758	A.B. Baldin <i>et al.</i>	(ITEP)	REFID=20195
					Translated from YAF 13, 1318.		
BEHREND	71	PRL	27	61	H.J. Behrend <i>et al.</i>	(ROCH, CORN, FNAL)	REFID=20197
BIZZARRI	71	NP	B17	140	R. Bizzarri <i>et al.</i>	(CERN, CDEF)	REFID=20198
COYNE	71	NP	B32	333	D.G. Coyne <i>et al.</i>	(LRL)	REFID=20201
MOFFEIT	71	NP	B29	349	K.C. Moffeit <i>et al.</i>	(LRL, UCB, SLAC+)	REFID=20204
ABRAMOVIC...	70	NP	B20	209	M. Abramovich <i>et al.</i>	(CERN)	REFID=20180
BIGGS	70B	PRL	24	1201	P.J. Biggs <i>et al.</i>	(DARE)	REFID=20184
BIZZARRI	70	PR	25	1385	R. Bizzarri <i>et al.</i>	(ROMA, SYRA)	REFID=20181
ROOS	70	DNPL	R7	173	M. Roos	(CERN)	REFID=20191
					Proc. Daresbury Study Weekend No. 1.		
AUGUSTIN	69D	PL	28B	513	J.E. Augustin <i>et al.</i>	(ORSAY)	REFID=20169
BIZZARRI	69	NP	B14	169	R. Bizzarri <i>et al.</i>	(CERN, CDEF)	REFID=20171
DEINET	69B	PL	30B	426	W. Deinet <i>et al.</i>	(KARL, CERN)	REFID=20173
JACQUET	69B	NC	63A	743	F. Jacquet <i>et al.</i>	(EPOL, BERG)	REFID=20176
WILSON	69	Private Comm.			R. Wilson	(HARV)	REFID=20179
Also		PR	178	2095	A.A. Wehmann <i>et al.</i>	(HARV, CASE, SLAC+)	REFID=20084
ASTVACAT...	68	PL	27B	45	R.G. Astvatsaturov <i>et al.</i>	(JINR, MOSU)	REFID=20055
BOLLINI	68C	NC	56A	531	D. Bollini <i>et al.</i>	(CERN, BGNA, STRB)	REFID=20164
BARASH	67B	PR	156	1399	N. Barash <i>et al.</i>	(COLU)	REFID=20160
FELDMAN	67C	PR	159	1219	M. Feldman <i>et al.</i>	(PENN)	REFID=20161
DIGIUGNO	66B	NC	44A	1272	G. Di Giugno <i>et al.</i>	(NAPL, FRAS, TRST)	REFID=20156
FLATTE	66	PR	145	1050	S.M. Flatte <i>et al.</i>	(LRL)	REFID=20157
JAMES	66	PR	142	896	F.E. James, H.L. Kraybill	(YALE, BNL)	REFID=10770
BARBARO...	65	PRL	14	279	A. Barbaro-Galtieri, R.D. Tripp	(LRL)	REFID=20152
BARMIN	64	JETP	18	1289	V.V. Barmin <i>et al.</i>	(ITEP)	REFID=20149
					Translated from ZETFP 45, 1879.		
KRAEMER	64	PR	136	8496	R.W. Kraemer <i>et al.</i>	(JHU, NWES, WOOD)	REFID=10755
BUSCHBECK	63	Siena Conf.	1	166	B. Buschbeck <i>et al.</i>	(VIEN, CERN, ANIK)	REFID=20146